

Helping Students With Transitioning From Visual to Abstract Understanding

What is CRA? CRA stands for *Concrete-Representational-Abstract*. CRA is a three-part instructional sequence where students interact with external, or concrete, representations to support internal, or abstract, understanding. At the concrete level, students manipulate objects, such as base-10 blocks, fraction bars, or geometric figures. At the representational level, students make their own representation (such as a drawing or symbol) and begin to internalize the meaning. Finally, at the abstract level, students work with numbers and symbols only.

Why should I use CRA? CRA is rooted in theories of learning development that suggest students learn better when a representational understanding of concepts has been established, as this supports abstract understanding.

When should CRA be used? CRA may be beneficial when introducing new mathematical concepts. In addition, it may be a beneficial intervention for students who struggle with abstract concepts.

What topics will help with CRA? Almost all topics can be taught with CRA. CRA may be especially useful in teaching operations, place value, and fractions.

How is it different from other common instructional practices? Typically, teachers may begin instruction at the abstract level, without providing students the opportunity to develop an internal, representational understanding first.

What are students expected to learn? Students are expected to demonstrate a representational understanding of a concept before being introduced to the abstract presentation.

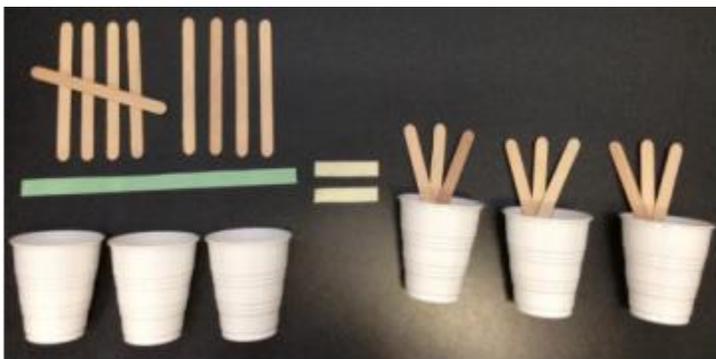
What should I avoid when using CRA? Students should use CRA for as long as necessary, although not all students may need the concrete stage.

What students can this help? Students with learning disabilities may especially benefit, as CRA may reinforce understanding or provide additional opportunities for practice. Multilingual/English learners also may benefit, as the concrete and representational stages are not specifically language dependent.

CRA		
Concrete	Representative	Abstract
<ul style="list-style-type: none"> Modeling mathematical concepts with tangible materials and manipulatives (e.g., base-10 blocks, counting bears). Students work “hands on.” 	<ul style="list-style-type: none"> Teacher transforms a concrete model into a representation, such as a drawing or symbol. Students create their own representations. 	<ul style="list-style-type: none"> Teacher models mathematics concepts using numbers, mathematical symbols, and correct mathematical notation. Students transition to using numbers and symbols only.

How do I teach this? Here's an example of teaching division with CRA (Witzel & Riccomini, 2009):

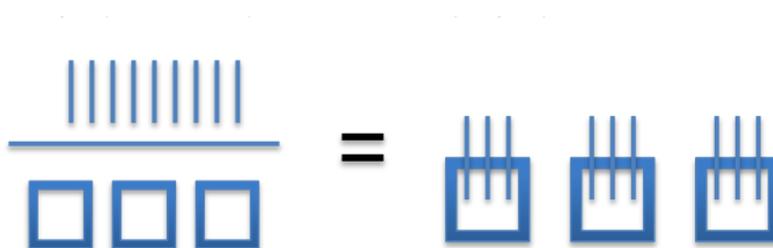
Concrete: Students use Popsicle sticks and cups to divide 9 sticks into 3 cups. "If we divide 9 sticks equally into 3 cups, how many does each cup have?"



Representational: Students draw a picture that represents a group of 9 being divided into 3 groups. "How many tallies do we have in each group?"

$$\frac{9 \text{ tallies}}{3 \text{ groups}} = 3$$


OR



Abstract: Students use only numbers and notation (division symbol and equals sign) to represent the division problem.

$$9 \div 3 = 3$$